North Buffalo Creek Fecal Coliform TMDL

City of Greensboro
Stormwater Management Division

NC Division of Water Quality

Public Meeting

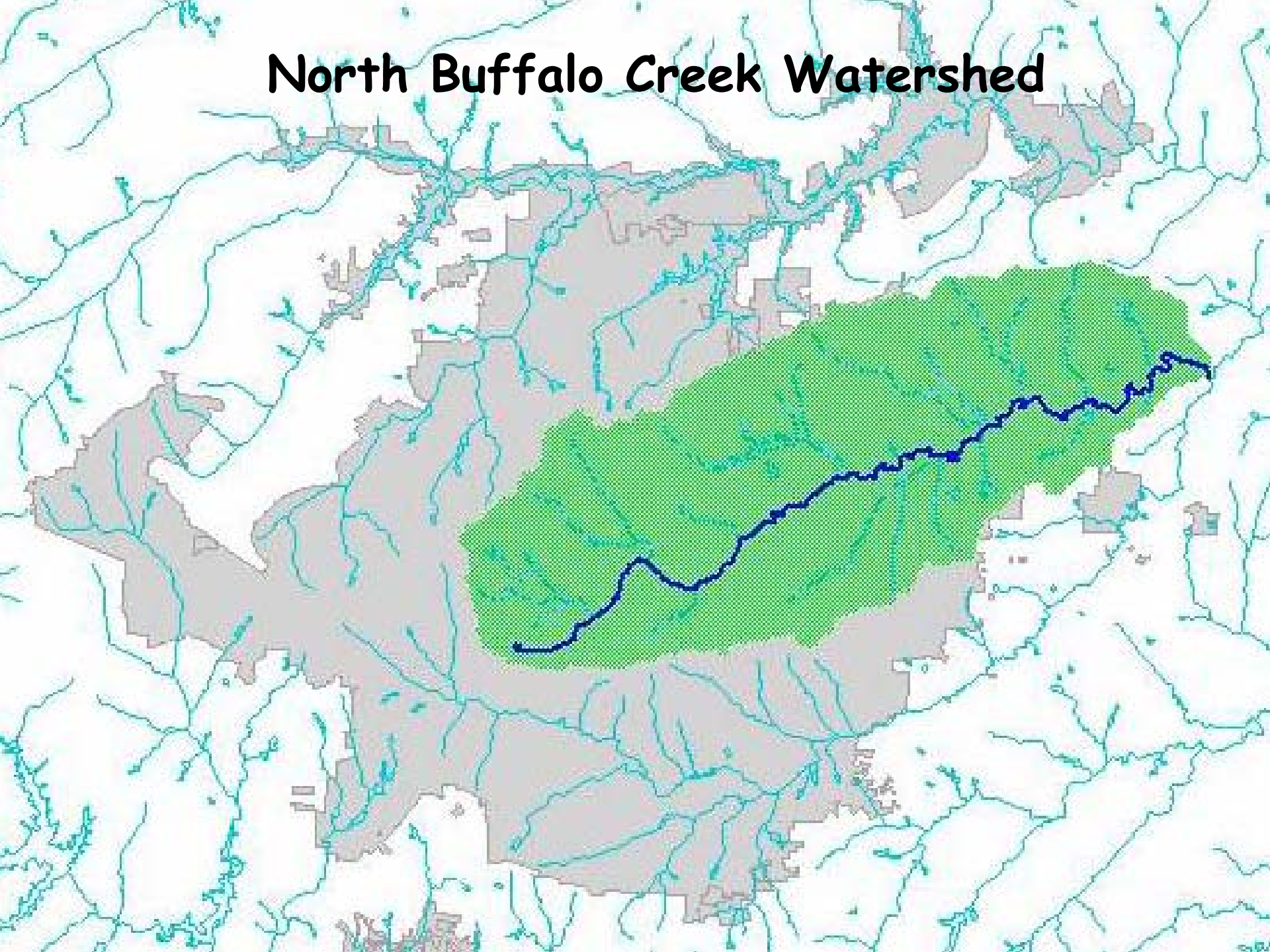
January 28th, 2004

Dewberry

Agenda

- Overview of the North Buffalo Creek watershed
- The TMDL process and our water quality goals
- Fecal coliform source assessment and watershed modeling
- Moving forward to implementation

North Buffalo Creek Watershed



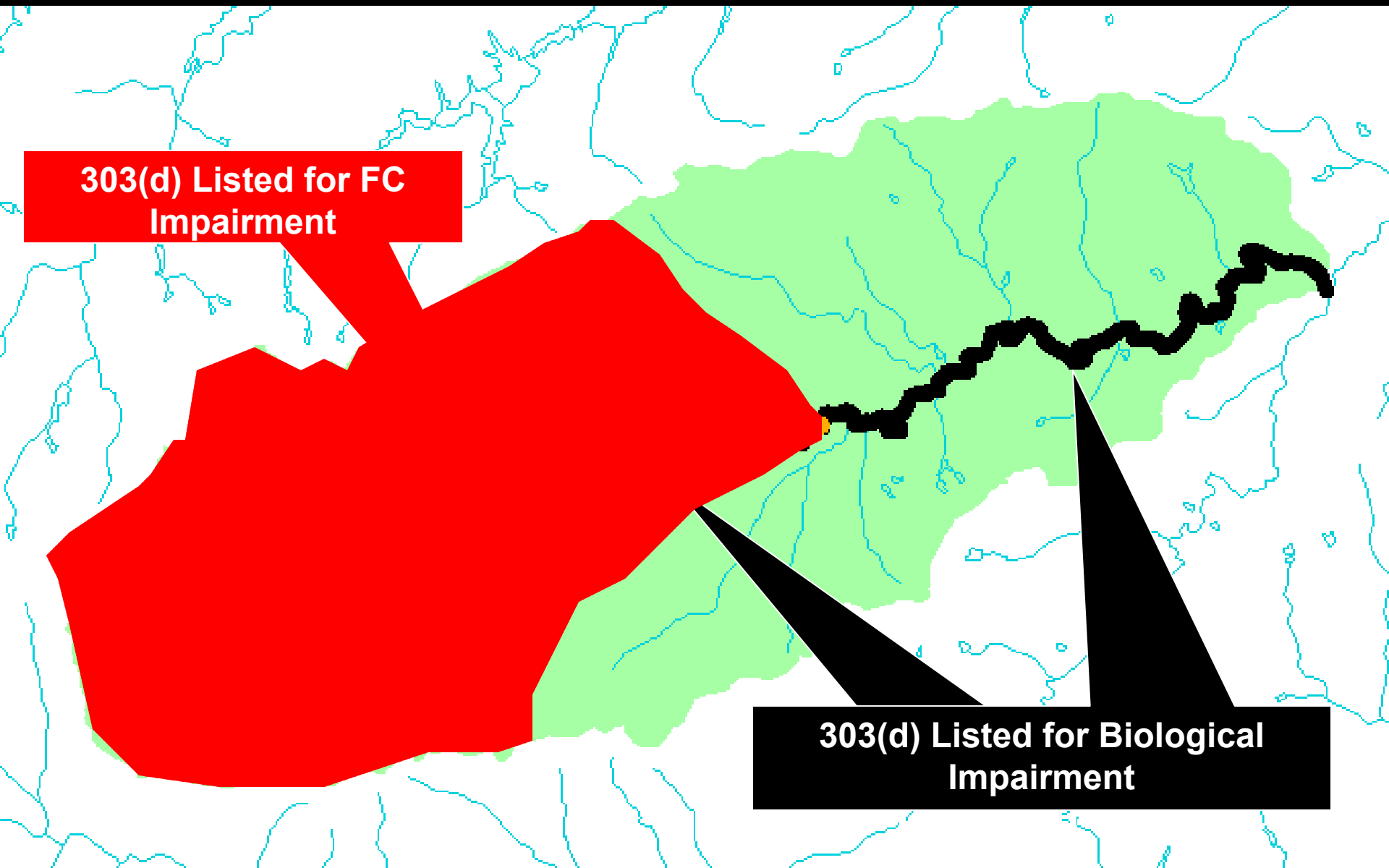
DWQ has Deemed the Stream "Impaired"

- North Buffalo on NC's 303(d) List
- *Stream is not safe for body contact recreation*
- *Stream is not supportive of aquatic life to the degree desirable*

FC Standard for Class C Waters

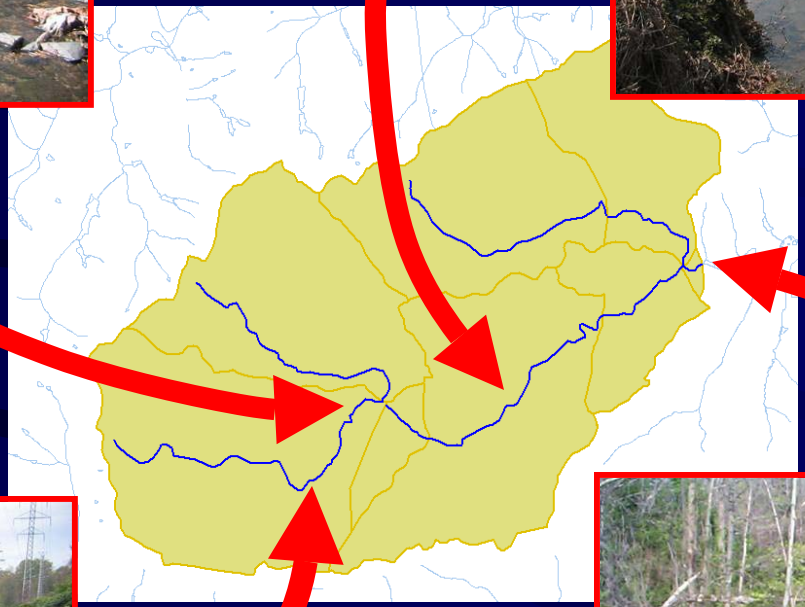
"FC shall not exceed a geometric mean of 200/100mL based upon at least 5 consecutive samples examined during any 30 day period, nor exceed 400/100mL in more than 20% of the samples examined during the period"

Impaired Reaches

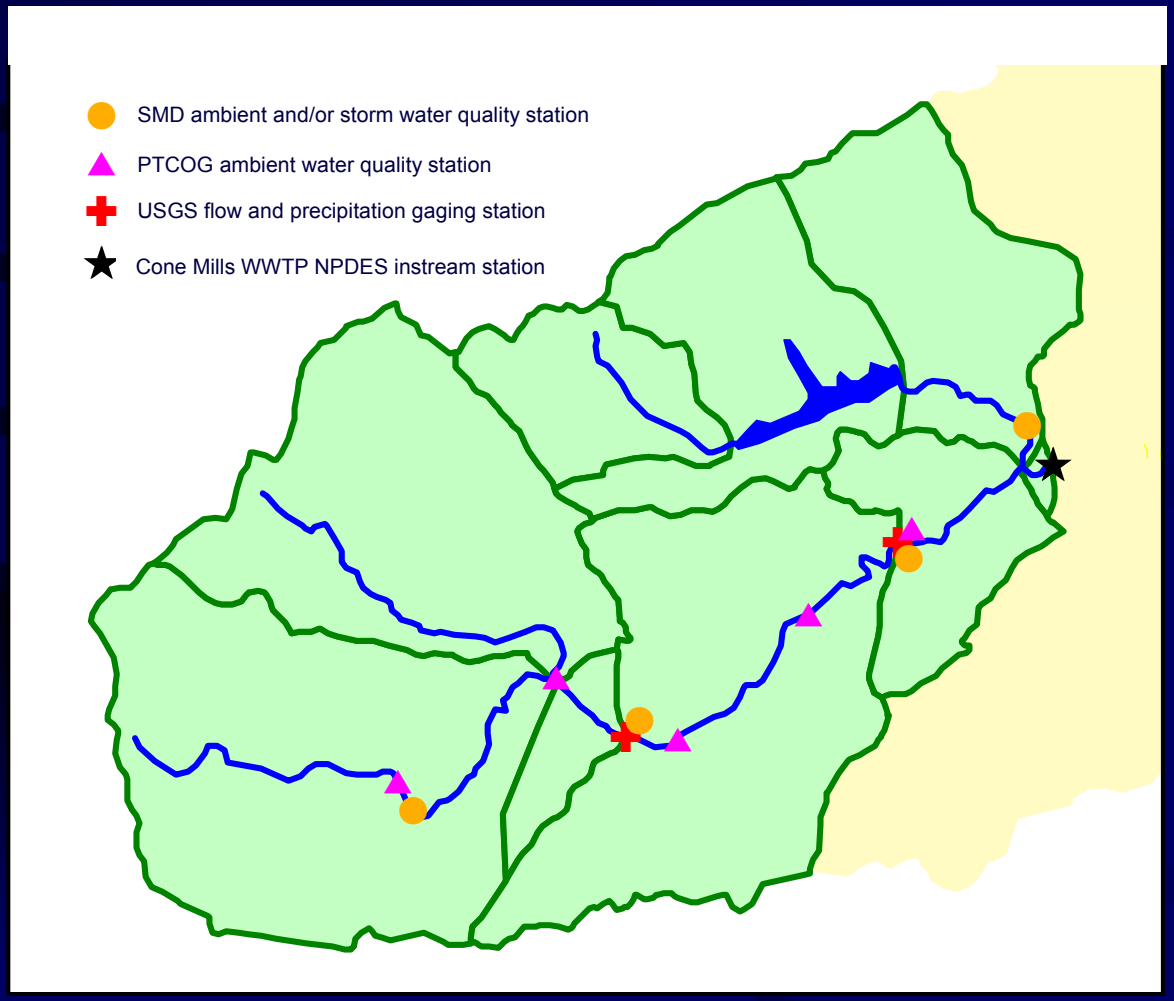


TMDL Area Above Summit Ave.

- Drainage area = 21.8 mi^2
- Mainstem length = 8.7 mi
- Population = 59,000
- Average impervious surface = 26%
- Land uses:
  - 38% residential
  - 20% forest
  - 15% roads and right of way
  - 13% commercial/industrial
  - Balance comprised of downtown, vegetated open space, institutional, etc



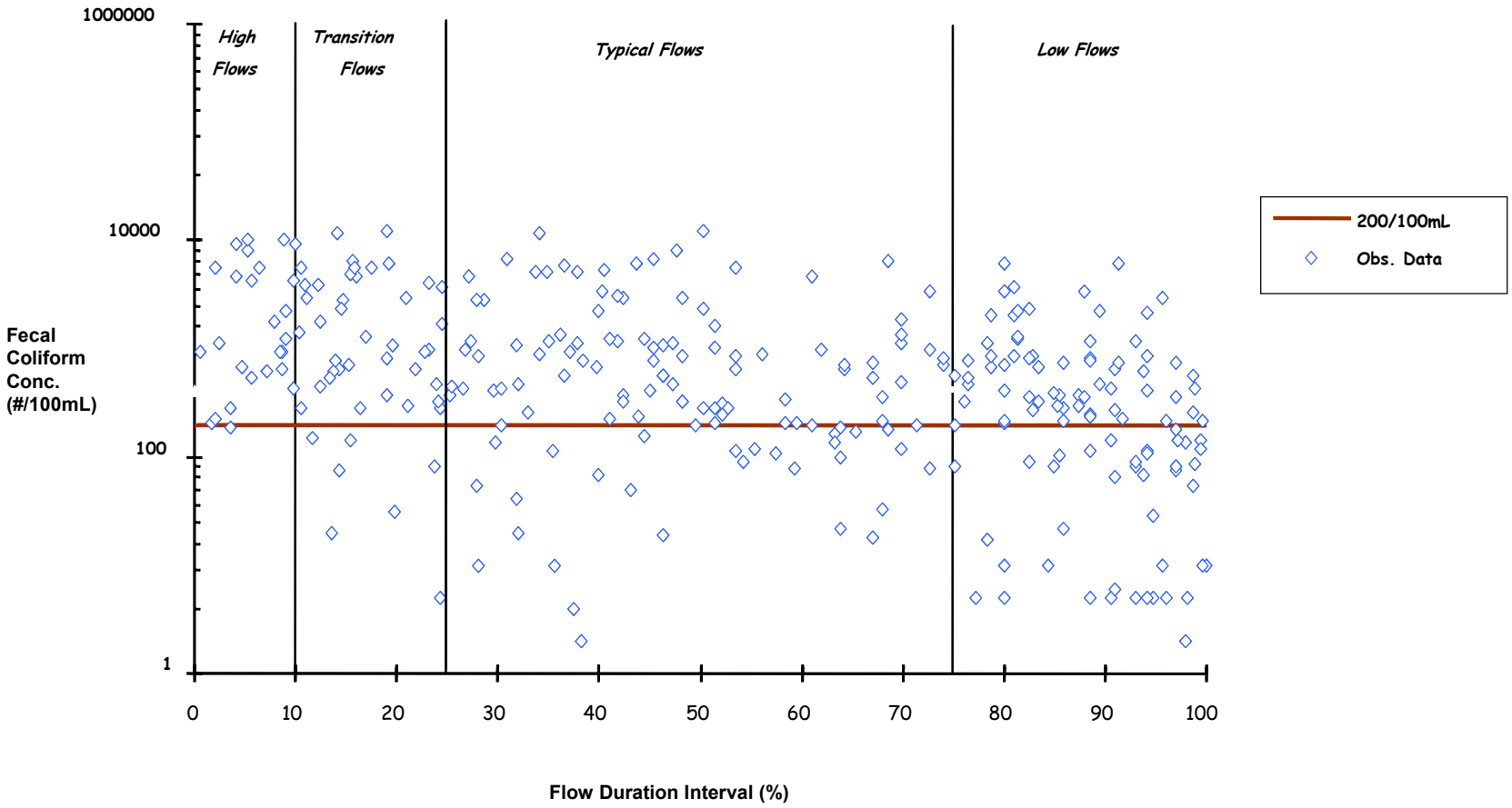
Monitoring Stations within the TMDL Area



General WQ Findings

- Geometric means are consistently above 200 cfu/100mL
  - True during wet weather, dry weather, summer time, and non-summer seasons.
- Fecal coliform concentrations tend to be higher in the summer than at other times of the year.
- Fecal coliform concentrations during storm periods are consistently higher than during dry weather conditions.

Observed FC Concentrations at Summit Ave.



High flows: 559 (modeled peak) – 70 cfs; Transition flows: 69 – 22 cfs; Typical flows: 21 - 10 cfs; Low flows: 9 – 3.4 (modeled low) cfs

What is a TMDL ?

- Total Maximum Daily Load
- Numeric estimate of the amount of a given pollutant a stream can assimilate and still maintain water quality standards and best uses.
- Compliance with standards are evaluated at point locations along a stream.
- TMDLs should involve a balanced assessment of contributing sources.

How is a Fecal Coliform TMDL Developed?

1. Identify/estimate significant sources.
2. Develop computer model to represent existing conditions.
3. Run source reduction scenarios using the model until your water quality targets are attainted.
4. Allocate allowable pollutant loads between sources.

TMDL Water Quality Targets

- 2 TMDLs in 1
  - Dry weather
  - All weather conditions
- Both TMDLs use the same numeric targets, just under different weather conditions
- 30-day geometric mean FC concentration <200/100mL
- <20% of samples >400/100mL

North Buffalo Ck Watershed Source Assessment

- Pets
- Sanitary Sewer Exfiltration
- Sewer System Overflows (SSOs)
- Septic Systems
- Waterfowl
- WWTP
- Illicit Discharges from the stormwater conveyance system
- Unidentified, Stormwater Related Sources

Pets

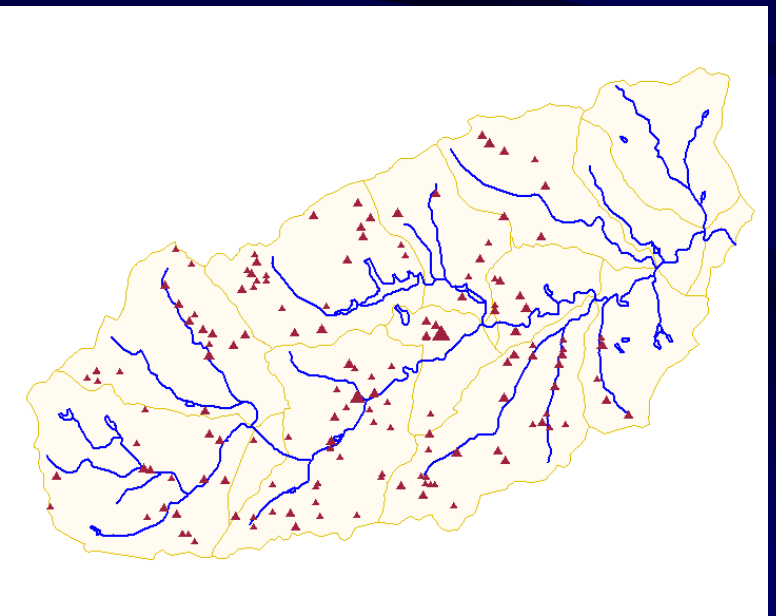
- Dog and cat populations estimated based on statistical procedure published by the AVMA
- 13,700 dogs
- 15,300 cats

Sanitary Sewer Exfiltration

- Breaks in pipe line
- Leakage through pipe joints

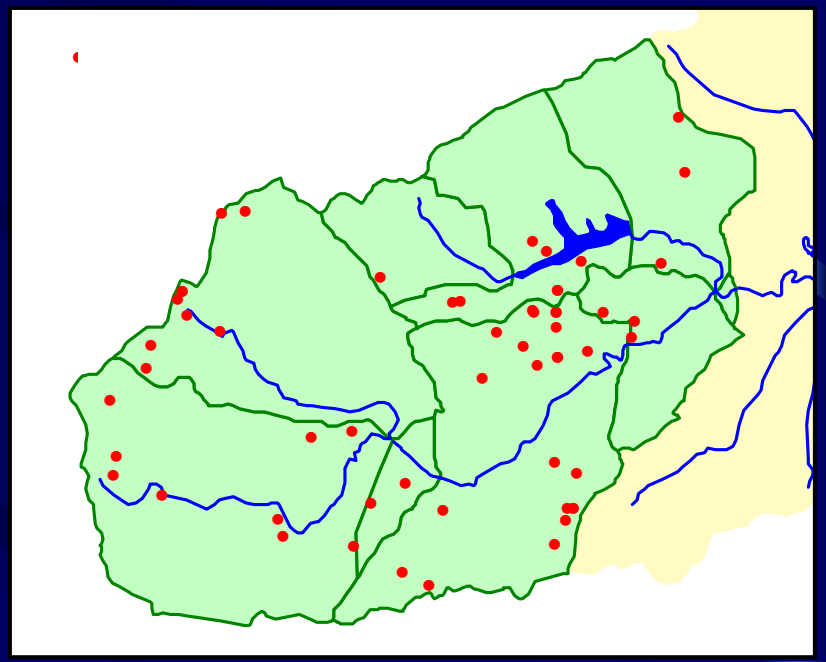
Sanitary Sewer Overflows (SSOs)

- City maintains an overflow database
- 131 SSOs accounted for in TMDL



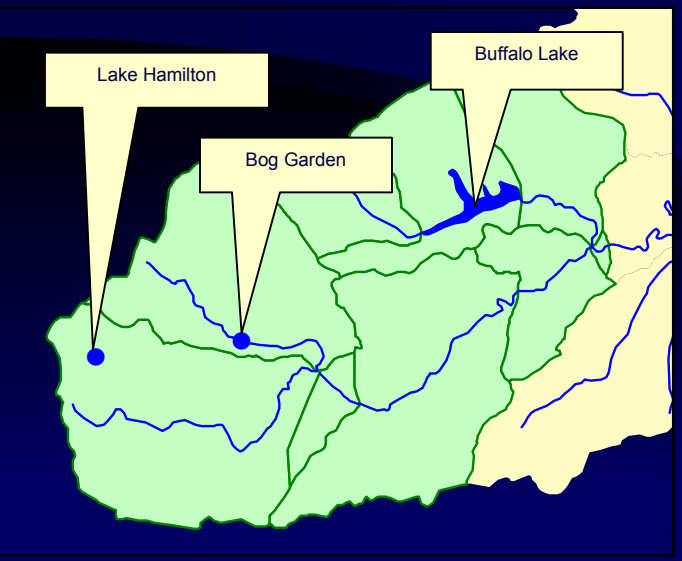
Failing Septic Systems

- Septic system locations estimated by comparing City water & sewer billing records
- 56 addresses identified
- 15% failure rate assumed



Waterfowl

- Waterfowl populations estimated based on field surveys and Audubon data



Cone Mills WWTP

- Textile manufacturing facility
- Permitted to discharge 1.25 MGD of treated industrial/domestic wastewater
- Ceased discharging in Summer 2001

Illicit Discharges from the SW Conveyance System

- Illicit discharges are those discharges which are not entirely comprised of stormwater runoff
- 66 illicit discharges accounted for in the TMDL

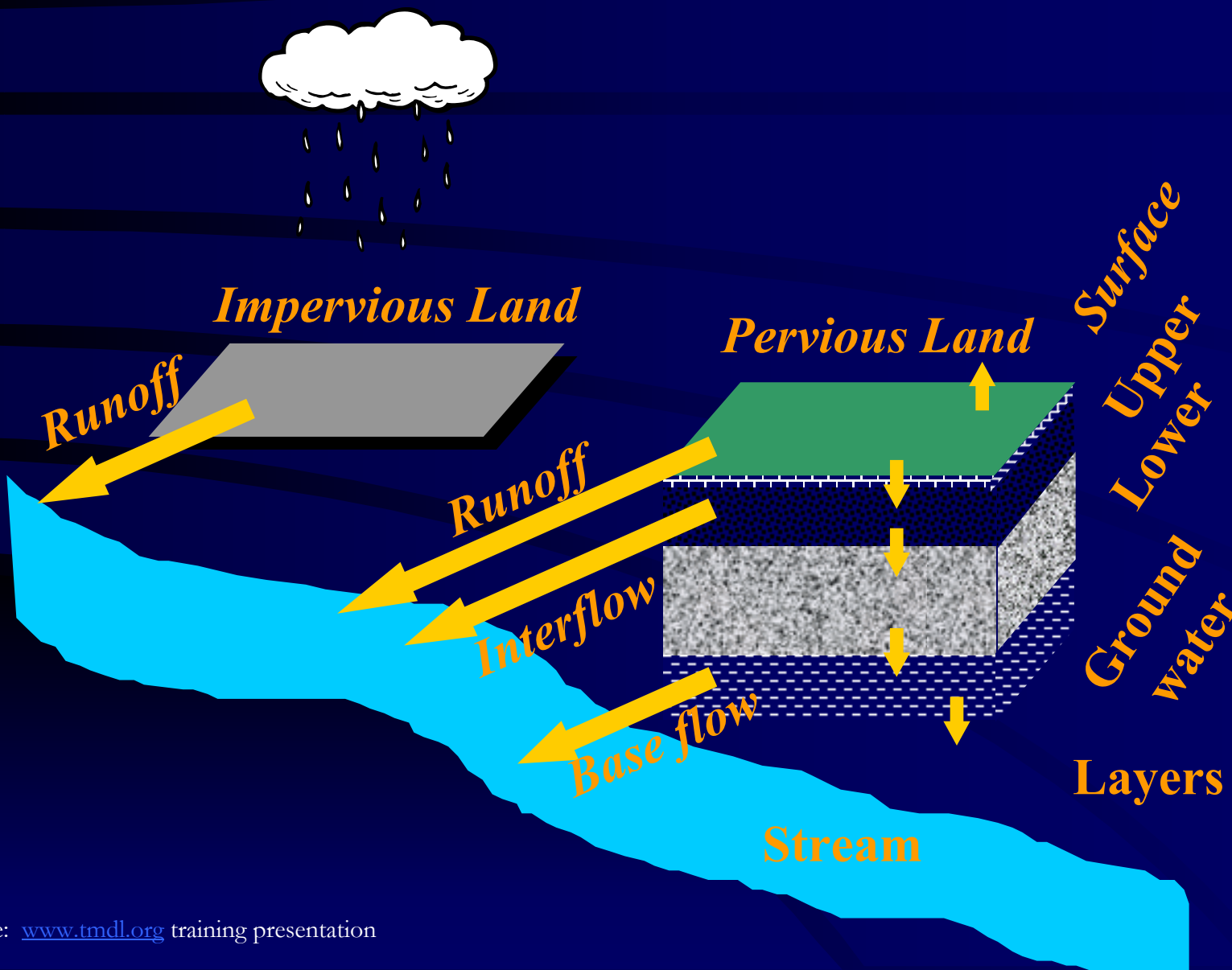
Other Sources

- Includes unidentified and/or unknown sources (includes wildlife)
- Used to account for fecal coliform loads not otherwise explicitly considered
- Transport to stream assumed to be via buildup-washoff type process

Watershed Modeling

- Objective:
  - Accurately simulate existing hydrologic and water quality conditions
  - Predict future water quality conditions given various FC load reduction scenarios

WinHSPF v.2.0.6

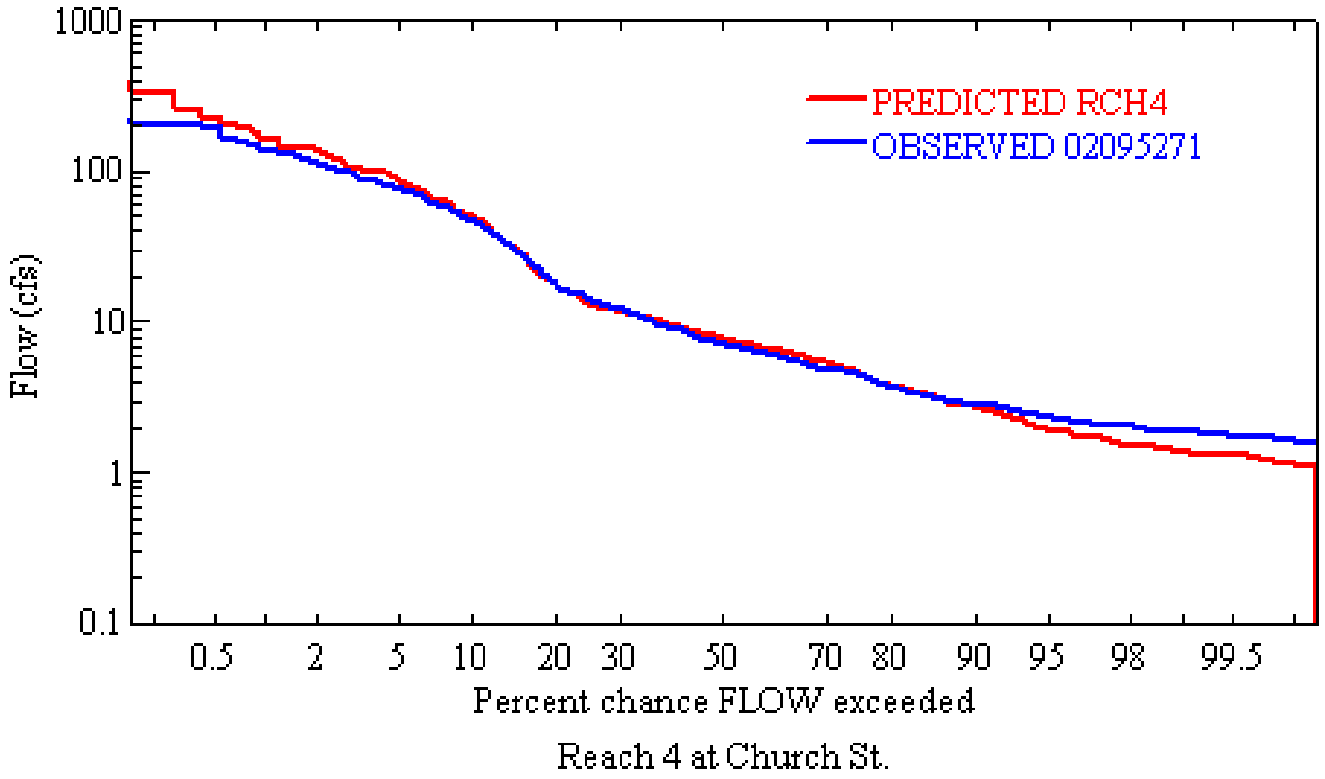


Source: www.tmdl.org training presentation

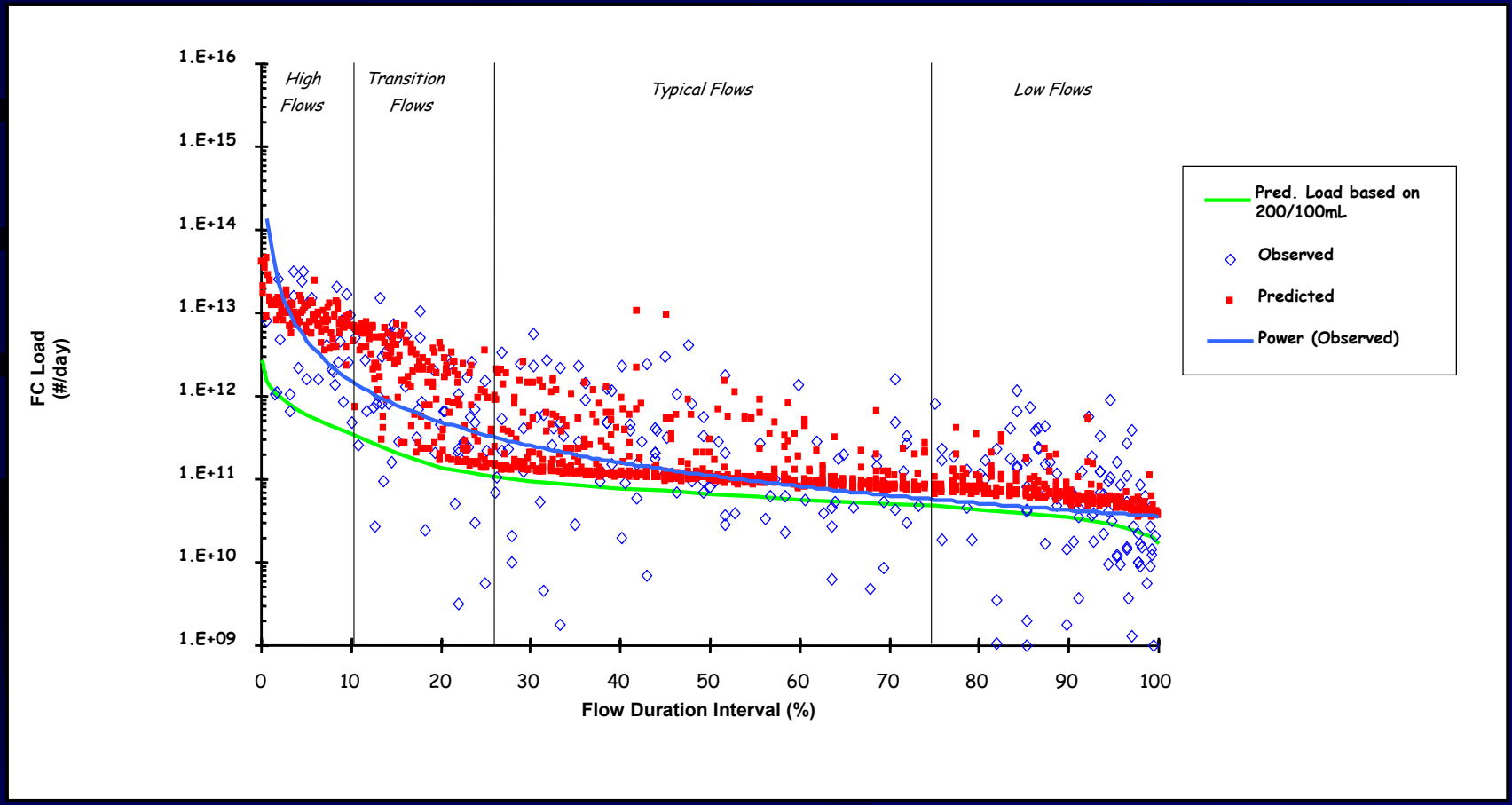
Model Simulation Period

- August 1, 1998 – August 1, 2001
- Period when USGS stream flow gaging and precipitation stations were installed at Westover Terrace and Church St.
- Period when several independent organizations were monitoring water quality

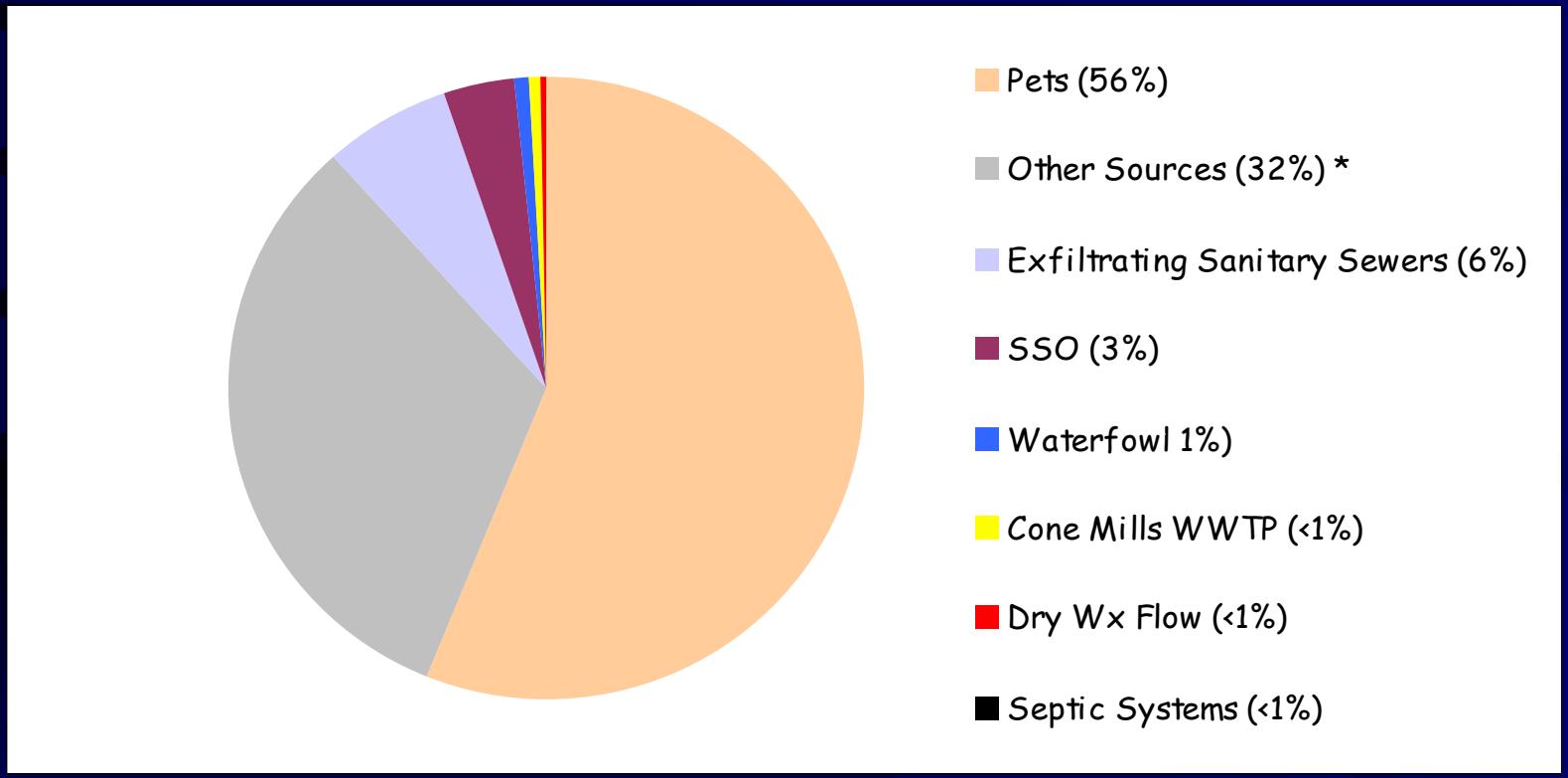
Hydrologic Model Calibration at Church St.



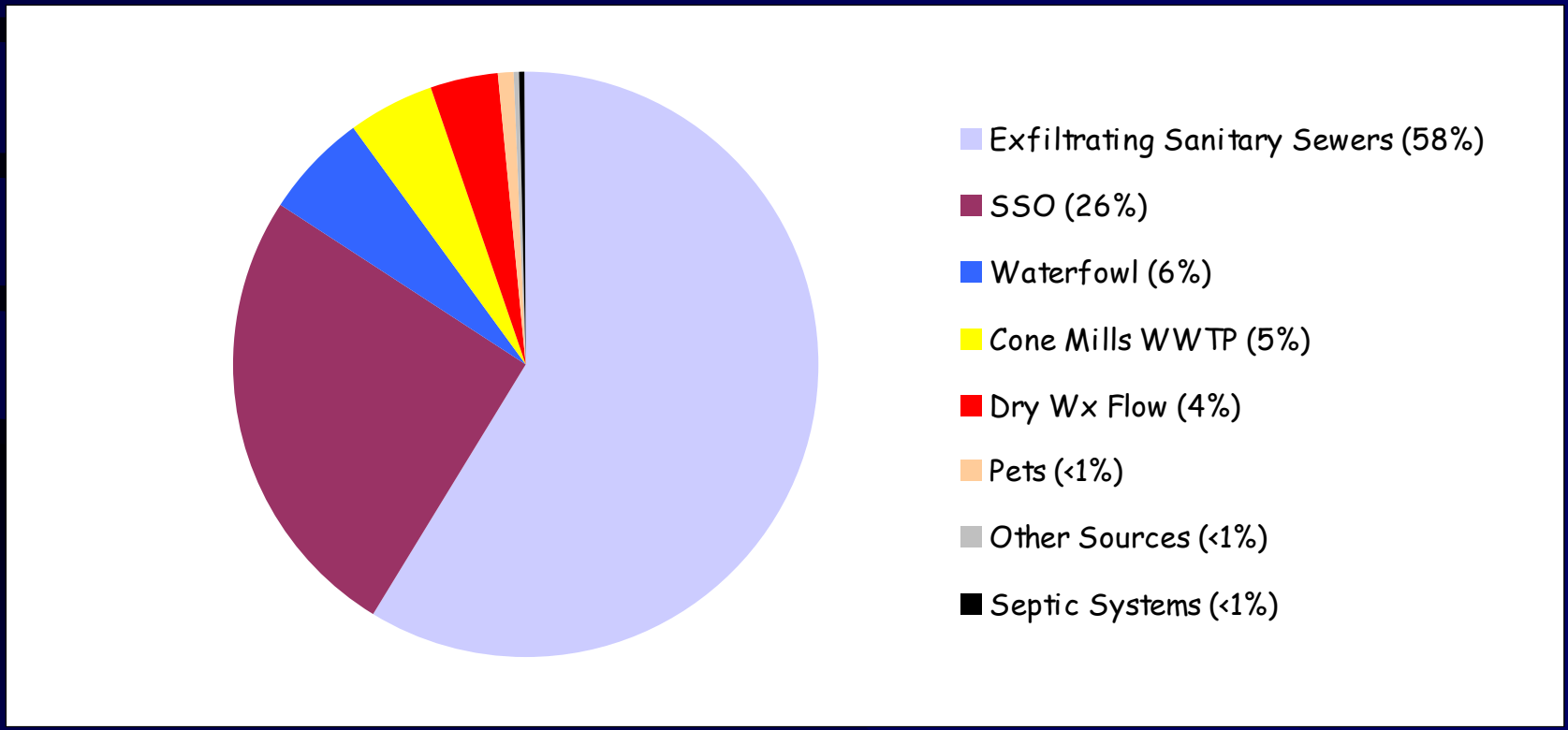
Fecal Coliform Calibration at Summit Ave.



Percentage of delivered load to Summit Avenue over the full simulation period (all weather conditions)



Percentage of delivered load to Summit Avenue under dry weather conditions



TMDL Components

$$TMDL = \Sigma WLA + \Sigma LA + MOS$$

Where:

WLA = allowable point source load

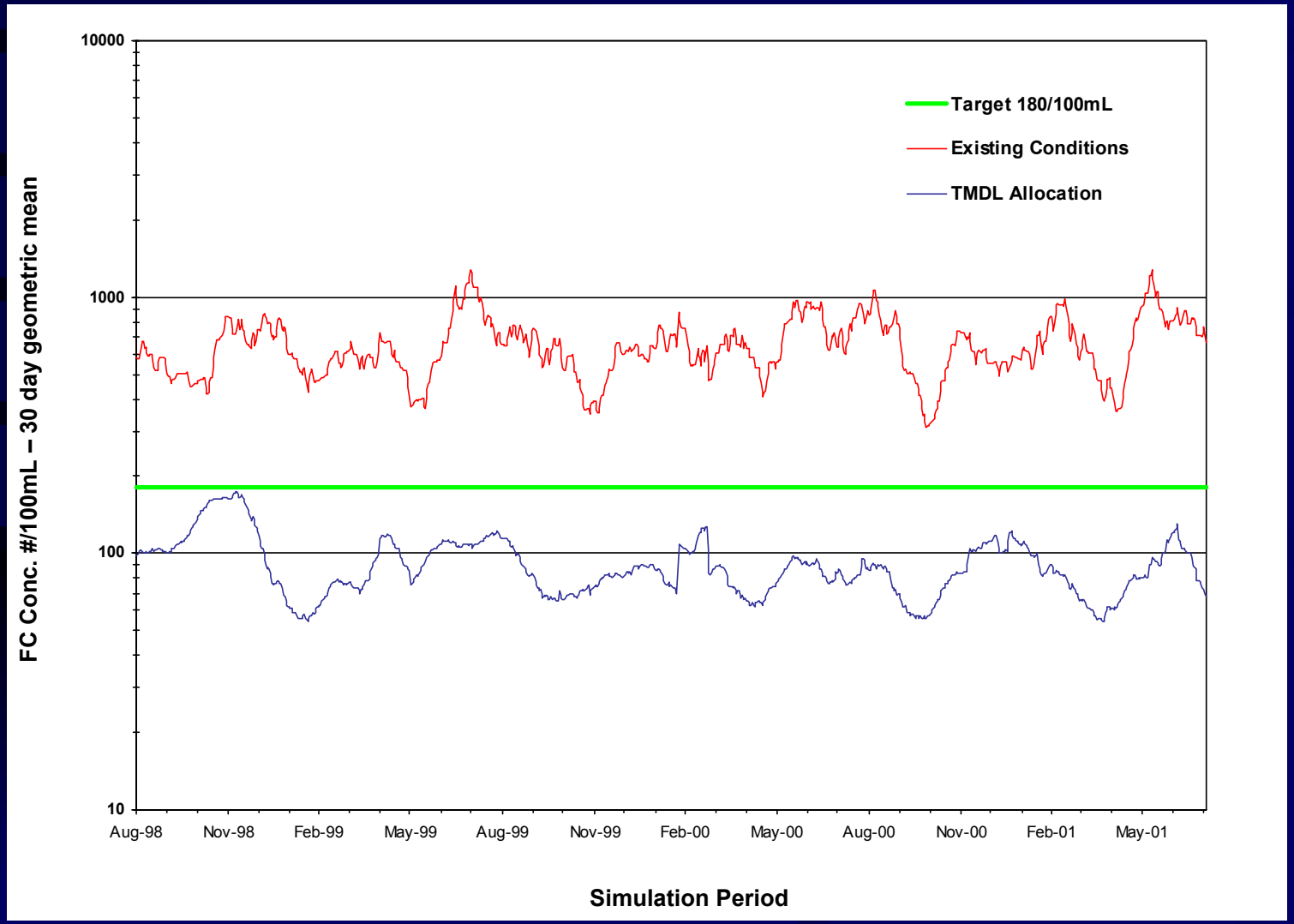
LA = allowable nonpoint source load

MOS = margin of safety

Relationship Between Sources and TMDL Allocation Categories

Source	WLA category	LA category
Pets	26%	74%
Other Sources	26%	74%
Sanitary Sewers	0%	100%
SSOs	0%	100%
Septic Systems	0%	100%
Waterfowl	0%	100%
Cone Mills WWTP	100%	0%
Illicit Discharges	100%	0%

Predicted geometric mean fecal coliform concentration at Summit Avenue (All weather Conditions TMDL)

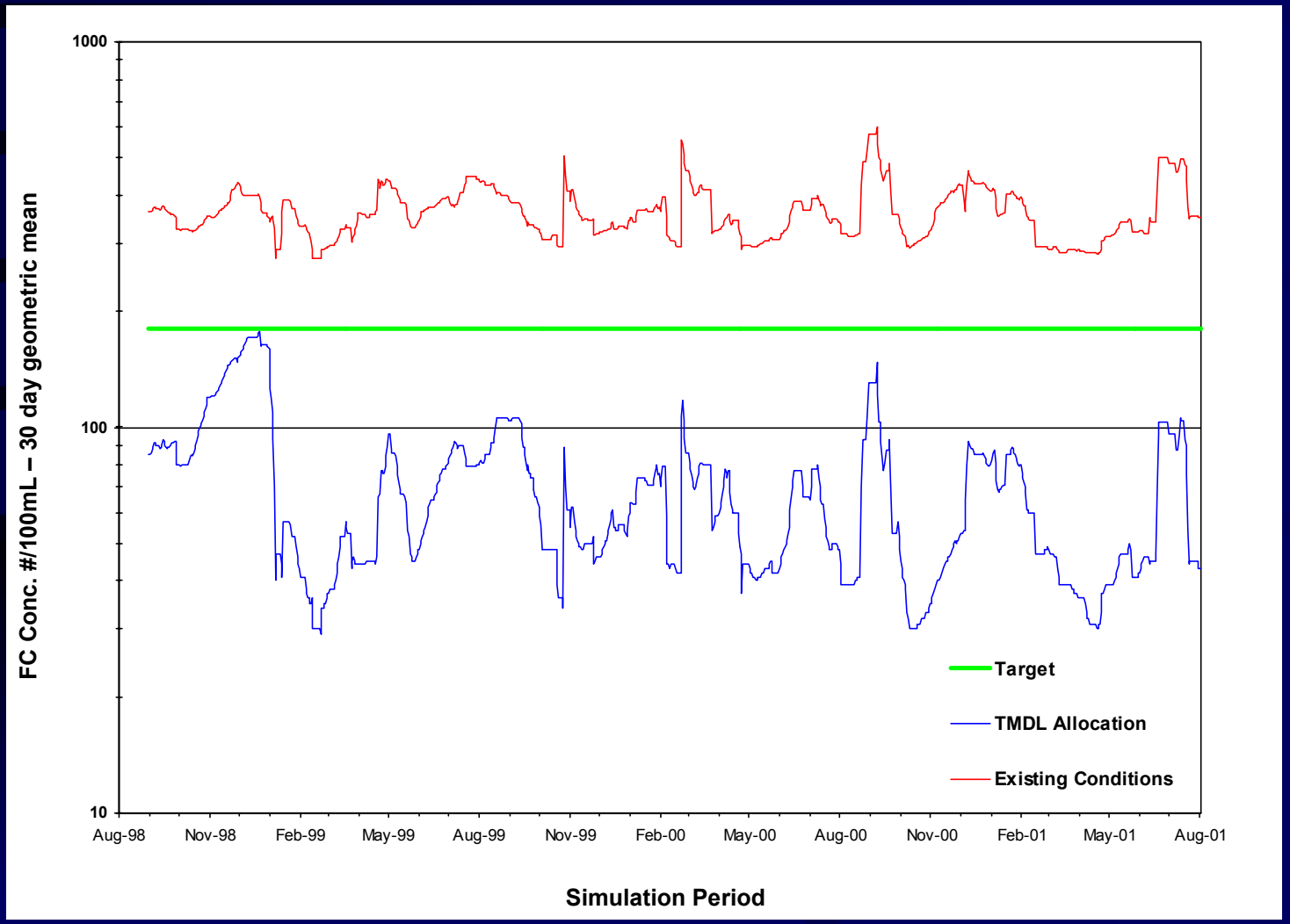


TMDL Reductions
All Weather Conditions

TMDL Allocation Category	TMDL % Reduction
MS4	96%
Nonpoint Sources	93%
Cone Mills WWTP	N/A

MS4 includes: Pets, Other Sources, Illicit Discharges
NPS includes: Pets, Other Sources, Exfiltrating Sanitary Sewers, SSOs, Septic Systems, and Waterfowl

Predicted geometric mean fecal coliform concentration at Summit Avenue (Dry weather Conditions TMDL)



TMDL Reductions
Dry Weather Conditions

TMDL Allocation Category	TMDL % Reduction
MS4	72%
Nonpoint Sources	70%
Cone Mills WWTP	N/A

MS4 includes: Pets, Other Sources, Illicit Discharges
NPS includes: Pets, Other Sources, Exfiltrating Sanitary Sewers, SSOs, Septic Systems, and Waterfowl

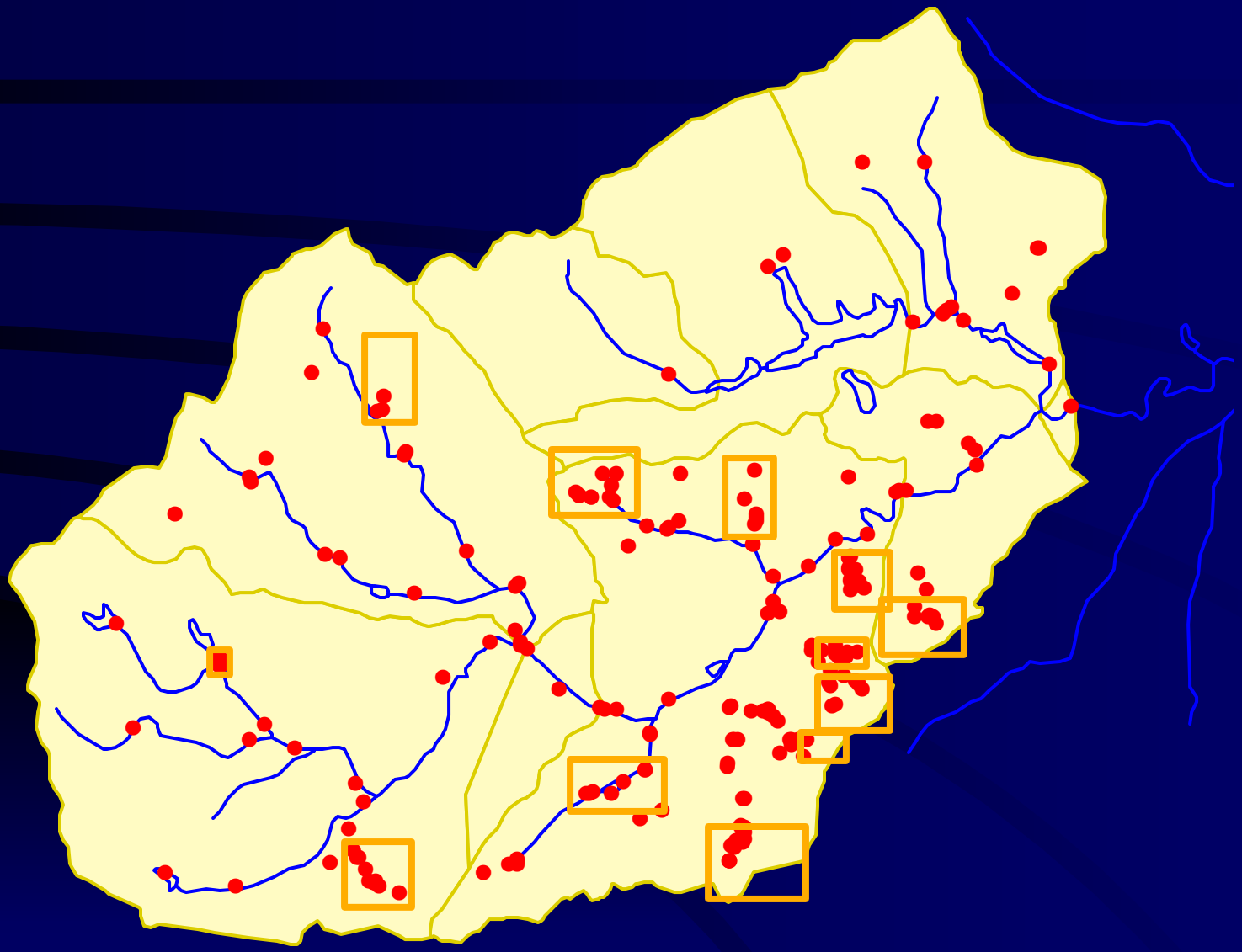
Moving forward to implementation

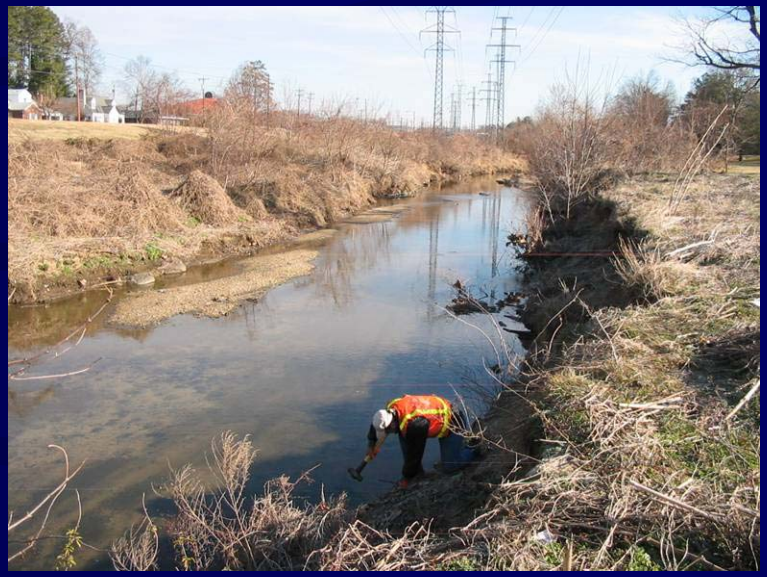
- Greensboro Water Resources Department has an established program to facilitate a wide variety of implementation strategies.
- Projects are already underway:
  - Sanitary sewer rehabilitation
  - Water quality investigation supported by the Cape Fear River Assembly

North Buffalo Creek Water Quality Investigation

- Focused within the TMDL area
- Goals:
  - ID specific dry weather FC sources and implementation actions
  - ID potential stressors to the aquatic benthic community (Dr. Anne Hershey, UNC-G)

FC Sampling Stations





Isolating Problem Areas

Questions ?